chance of precipitation is 80 per cent, the rainy spells average 8.3 days in length and the "dry" spells 1.9 days. It rarely rains hard, however. In giving the annual total of approximately 850 mm. (34 inches), about half the days had less than 1 mm., while the maximum 24-hour rainfall was but 42.6 mm. (1.70 inches). Precipitation, except for the very rare local showers, comes as a driving, chilling drizzle or as a gale-borne sleet and snow. The winter is characterized by frequent brief snowfalls, most of its precipitation being in this form. Spring is the snowiest season and October the snowiest month. More than half the days of the year have snow, but the landscape is snow covered on only a third of the days. In the words of Meinardus:

> The winter brings the greater total of precipitation, greater violence and frequency, but shorter duration; the summer brings less, more gentle, and rarer but more lasting precipitation. * * * The observer on Kerguelen will, even in midsummer, when the sun stands 60 degrees above the horizon, be reminded of winter by snow flurries, and he can never be sure whether the snowfalls which he then records should be regarded as a remnant of the bygone winter or as a forerunner of the coming one. In this disagreeable condition he may recognize a far-reaching effect of the Antarctic, extending its merciless influence through the chilly oceanic spaces into Kerguelen's latitude and beyond.

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## NOTES, ABSTRACTS, AND REVIEWS

### AEROLOGICAL WORK OF THE GERMAN SOUTH ATLANTIC EXPEDITION ENDING APRIL, 1926 [1]

The *Meteor*, on which the scientific work of the expedition was carried out, ended her fifth "profile" cruise at Cape Town early in April, 1926. Her first five cross-Atlantic voyages took place between latitudes 28° and 64° S. Each was run for as great a distance as practicable nearly along a parallel of latitude, largely between Buenos Aires and Cape Town as bases. A comprehensive aerological program formed part of the scientific objectives of the expedition.

A total of 354 pilot balloon ascents were made. Of these, 292 averaged 3,560 m. in height. Of these again, 25 per cent passed 5,000 m., and about 10 per cent 10,000 m., surely an excellent achievement in view of unsettled weather and relatively high winds experienced during much of the time. The intention to carry out two ascents daily was adhered to except when the weather made them impossible. This meant that many observations were made when clouds soon obscured the balloon; but the total of such cases, plus those in which kites also disappeared in the clouds, made possible a very accurate fixing of the altitudes of cloud bases on 185 occasions and for several different cloud types.

Kite flights totaled 67 for the 5 voyages, and there were determinations of cirrus direction and velocity on 46 days, many of the latter in double series.

Difficulties with the kites were numerous and persistent, especially during the earlier voyages of the series. On profile IV, the first part of the voyage was so boisterous as to call for the use of small "storm kites" and heavy wire, thus restricting the heights attained. Special trouble was encountered in the landings. The ship being often under sail to save coal, or hove to with engines going for making deep-sea soundings, the kites frequently plunged wildly in the atmospheric eddies caused by the sails or were smashed by the propellers when pressed down to the surface of the sea by gusts. Headlong dives, and sometimes the loss of the kites and instruments, followed the catching of the kite wire in the rigging. The assistant personnel frequently found itself being pulled along the slippery, heaving deck by the tugging kites. The net result of these exciting experiences was a total of 10 successful kite flights for the whole voyage on profile IV.

The last voyage was the most varied of all as regards conditions for aerological work, but nevertheless probably the most successful. Between its beginning at Buenos Aires and the first stop, Punta Arenas, the total of 20 pilot balloon ascents reached an average altitude of 8,860 m., 14 exceeded 5,000 m., 7 went beyond 10,000 m., and 1 balloon reached 20,250 m. The *Meteor* steamed thence southward via inside channels, passed out into the Southern Ocean within sight of Cape Horn, and in extraordinarily fine weather for the latitude crossed to the South Shetland Islands. She went thence to South Georgia and Bouvet Island and thence as far south as ice conditions permitted, accomplishing altogether 25 kite flights to an average height of 1,900 m. and a maximum of 3,510 m. Four flights were carried out south of latitude 64°. One flight, between South Georgia and Bouvet Island, took place close to the center of a cyclone, in thick cloud and snow squalls. It will be of interest here to quote from the report a section showing how the aerologists of the expedition met the difficulties encountered on this far southern voyage:

> The weather was generally better west of longitude 18° W., and many successful flights were there made. Nevertheless, on account of short coal supply the ship was in a number of cases not able to maneuver for the benefit of the kite work; the flights always involved a loss of time and distance. * * * The great number of flights was made possible by a change in technique. Our earlier experience had been that it was impracticable to carry out kite flights while the ship was making a sounding, because whatever might be happening to the kites the ship was not free to maneuver on account of the lead line. In many cases we lost kites on this account. Of the 25 ascents on profile V, 15 were accomplished during deep-sea soundings, the lack of safety being compensated for by using a thicker wire, the reel drum being wound with 0.8 and 0.9 mm. wire. As a result, in spite of much heavier winds, we had no breakaways.

For the whole of this last voyage, pilot balloon flights totaled 57 and the altitudes averaged 3,130 m. Of these, 11 ascents exceeded 5,000 m., 4 exceeded 10,000 m., and 1 reached 14,800 m.

The importance of the aerological work carried out by the *Meteor* in these remote latitudes can scarcely be overestimated. Interpretation of the results will be awaited with the greatest interest.—*B. M. V.*

[1] Die Deutsche Atlantische Expedition auf dem Vermessungs- und Forschungsschiff "Meteor." Part 2. See *Zeitschr. der Gesell. für Erdkunde*, Berlin, Jahrgang 1926, Nr. 5/6. Part 1 of this report appeared in the same journal, 1926, no. 1. The section on meteorology of Part 2 is by J. Reger and E. Kuhlbrodt.

Another report on the expedition, by the scientific director, Dr. A. Merz, is contained in *Sitzungsberichte der Preussischen Akademie der Wissenschaften*, 1925, XXXI, and constitutes a preliminary report on some of the scientific results. It includes a chart of the 14 profiles run by the *Meteor*. Chief among the charts showing scientific results of the expedition are: A temperature cross section for the upper 1,000 m. of depth in the South Atlantic along latitude 35° S.; a temperature cross section from latitude 70° N. to 80° S. along the meridian of 30° W. in the Atlantic; the temperature distribution at 400 m. depth in the North Atlantic; a salinity cross section from latitude 70° N. to 80° S. along 30° W. longitude.